

**REPLACED BY
ART 34 AMDT**

Patent claims

1. The use of a nanocomposite composition comprising
a) a polymerizable silane of the general formula (I) and/or (II) and/or condensates
5 derived therefrom



in which the radicals X are identical or different and are hydrolyzable groups or
hydroxyl groups;



in which R^1 is a nonhydrolyzable radical, R^2 is a radical carrying a functional group,
X has the above meaning and a and b have the value 0, 1, 2 or 3, the sum (a + b)
having the value 1, 2 or 3,

15 and

b) nanoscale particles selected from the group consisting of the oxides, sulfides,
selenides, tellurides, halides, carbides, arsenides, antimonides, nitrides, phosphides,
carbonates, carboxylates, phosphates, sulfates, silicates, titanates, zirconates,
aluminates, stannates, plumbates and mixed oxides thereof,

20 as a resist for the microstructuring of semiconductor materials, flat screens,
micromechanical components and sensors.

2. The use as claimed in claim 1, wherein the nanocomposite composition
contains from 1 to 50 percent by volume, preferably from 1 to 30 percent by volume,
25 of nanoscale particles.

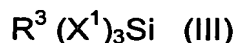
3. The use as claimed in claim 1 or 2, wherein the nanoscale particles have
been surface-modified with compounds selected from the group consisting of the
carboxylic acids, carboxamides, carboxylic esters, amino acids, β -diketones, imides,
30 quaternary ammonium salts of the general formula $\text{N}^+ \text{R}^{10} \text{R}^{20} \text{R}^{30} \text{R}^{40} \text{Y}^-$, where the
radicals R^{10} to R^{40} are identical or different and may be aliphatic, aromatic and/or
cycloaliphatic groups and Y^- is an inorganic or organic anion.

4. The use as claimed in at least one of claims 1 to 3, wherein the nanocomposite composition contains polymerizable monofunctional and/or bifunctional monomers, oligomers and/or polymers selected from the group consisting of (poly)acrylic acid, (poly)methacrylic acid, (poly)acrylates,

5 (poly)methacrylates, (poly)acrylamides, (poly)methacrylamides, (poly)carbamides, (poly)olefins, (poly)styrene, (poly)amides, (poly)imides, (poly)vinyl compounds, (poly)esters, (poly)arylates, (poly)carbonates, (poly)ethers, (poly)etherketones, (poly)sulfones, (poly)epoxides, fluorine polymers, organo(poly)siloxanes, (poly)siloxanes and hetero(poly)siloxanes.

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5. The use as claimed in at least one of claims 1 to 4, where the nanocomposite composition contains a fluorosilane of the formula (III)



15 in which

R^3 is a partly fluorinated or perfluorinated C_2 - C_{20} -alkyl and

X^1 is C_1 - C_3 -alkoxy, chlorine, methyl or ethyl.

6. The use as claimed in at least one of claims 1 to 5, wherein the
20 nanocomposite composition contains a crosslinking initiator.

7. A microlithographic arrangement comprising

a) a microstructured layer of a nanocomposite composition as claimed in any of claims 1 to 6, as a top coat;

25 b) a bottom coat comprising an aromatics-containing polymer or copolymer containing novolaks, styrenes, (poly)hydroxystyrenes and/or (meth)acrylates;

c) a substrate.

30 8. The microlithographic arrangement as claimed in claim 7, wherein the top coat a) is a sol film.

9. The microlithographic arrangement as claimed in claim 7 or 8, wherein the substrate c) is a semiconductor material.

5 10. A method for the production for microlithographic arrangement as claimed in one or more of claims 7 to 9, comprising the steps:

- i) production of a planar uncured sol film of a nanocomposite composition as claimed in at least one of claims 1 to 6;
- ii) production of a target substrate comprising a bottom coat b) and a support c);
- 10 iii) transfer of sol film material from i) by means of a microstructured transfer imprint stamp to the bottom coat b) in ii);
- iv) curing of the transferred sol film material;
- v) removal of the transfer imprint stamp to give an imprinted microstructure as top coat a).

15 11. The method as claimed in claim 10, wherein the uncured sol film i) is applied to a planar starting substrate comprising a support and/or an adhesion-promoting film.

20 12. The method as claimed in claim 10 or 11, wherein the transfer imprint stamp comprises silicone, glass or silica glass.

25 13. The method as claimed in one or more of claims 10 to 12, wherein the transfer imprint stamp is pressed into the sol film i) for from 5 to 300 seconds, then removed and placed on the bottom coat b) in the course of from 10 to 300 seconds and pressed against b) for a time of from 10 to 300 seconds under a pressure of from 10 to 100 kPa.

30 14. The method as claimed in one or more of claims 10 to 13, wherein thermal curing or UV curing is carried out while the transfer imprint stamp is pressed against b).

15. A method for the production of a microstructured semiconductor material, comprising the steps i) to v) as claimed in claim 10, support c) being the semiconductor material to be structured, and the steps

- 5
- vi) plasma etching of the residual layer of the nanocomposite sol film, preferably with CHF_3/O_2 plasma,
 - v) plasma etching of the bottom coat, preferably with O_2 plasma,
 - vi) etching of the semiconductor material or doping of the semiconductor material in the etched areas.